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Journal of the Society of Arts.

FRIDAY, AUGUST 21, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th ult., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited.

Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

NOTICE TO INSTITUTIONS.

The Programme for the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

PETROLEUM OIL.

Within the past three years a vast and rapidly-increasing traffic has sprung up in a mineral product whose existence, though long known, had excited little previous attention,—the rock or petroleum oil. Efforts had been made since 1846—and with moderate success—to supply an oil for illuminating and lubricating purposes distilled from the softer, or, as they were usually called, the fatty coals. The English cannel coals, the Nova Scotia cannel, the Breckenridge, and some other of the bituminous coals of the western slope of the Apalachian range, produced these oils in considerable quantity. The oils—or rather hydrocarbons—thus distilled were less dense than ordinary animal or vegetable oils, but exhaled a peculiar and somewhat unpleasant odour, and burned with abundant smoke, requiring a peculiarly-constructed lamp to consume the excess of carbon. In 1859 there began to be a considerable production of oil from the petroleum wells or pools which had been known to exist in Venango county, Pennsylvania, and its vicinity for more than a century, and from some new ones opened in August of that year at Titusville by Messrs. Bowditch and Drake, and the question of the probability of combining this oil with that distilled from the coal, or of using it alone, after refining, as an illuminating oil, began to be discussed. After careful investigation and experiment, it was demonstrated that, though possessing less body than the coal-oil, it could be used with satisfactory results for illuminating purposes. But there was still a difficulty. Could a uniform and sufficient supply be procured, or were the wells and pools as yet opened merely limited deposits, liable to be soon exhausted? This question, which need not have occasioned any anxiety, had the history of petroleum deposits been more generally known, was solved in August 1861, by the discovery—the result of deeper boring—of spontaneous flowing wells, which threw up vast quantities of the oil,—more, indeed, than could be saved at first, with the scanty supply of tanks, vessels, barrels, &c.,

which had been required by the pumping wells which up to that time had been the only source of supply. An intense excitement followed in the oil-region of Pennsylvania, which lay mainly along the valley of Oil Creek and its tributaries in Venango, Warren, and Crawford counties. Three thousand barrels of oil a day were obtained from a single well, and in every direction new borings were going on, and new discoveries of flowing wells were made almost daily; while other regions of similar geological structure were carefully explored for evidence of their capacity for producing oil. Soon there were oil-wells,—either pumping or flowing,—yielding considerable quantities, in Western Virginia, Kentucky, Ohio, and Canada; and more recently discoveries have been made of the existence of petroleum in large quantities in California and in some of the North-western States. At first vast quantities of the oil were wasted; but latterly the flowing wells have been fitted with strong tubing and stop-cocks, so that the supply is entirely under control.

The quantity sent to market from the Pennsylvania wells in 1859 did not exceed 20,000 gallons, of which 13,000 gallons went over the Sunbury and Erie road. In 1860 the number of pumping wells had increased till, at the close of the year, there were nearly 2,000: of these, however, only 74 yielded any considerable quantity. The daily yield of these was about 1,165 barrels, or 46,600 gallons, and as the price of the crude oil was then 20 cents per gallon, this amount was worth about 9,320 dollars. The total quantity sent to market in 1860 was but little over 2,000,000 gallons. In 1861 the production increased greatly, especially after the discovery of the flowing wells. Not less than 20,000,000 gallons were sent to market, and large quantities retained in the oil-region. Meantime, a considerable export demand for the oil had sprung up in Great Britain, France, Belgium, Germany, South America, and the West Indies. The entire exports of the year—including those to California—were probably not far from 2,500,000 gallons.

In 1862 the traffic met with a still more rapid development. The foreign demand, at first dull, gradually increased, and Liverpool became the great foreign market of the trade, though considerable quantities were shipped to other ports. Nearly 3,000,000 gallons was sent to that port alone, and about 5,000,000 to all the British ports. The exports from the principal ports to foreign countries were as follows:—

		Dollars.
New York ...	6,783,563 gallons, valued at	20,37,413
Philadelphia ...	2,607,203 " "	529,575
Boston ...	891,616 " "	457,859
Baltimore ...	1,120,000 " "	500,000
Total ...	11,402,382 " "	3,524,847

The invoices of these shipments are undoubtedly too low, as Mr. Macrae, a leading Liverpool oil-broker, on the 18th October, 1862, estimated, from data in his possession, the receipts of petroleum oils in Great Britain alone from the United States and Canada during the year at over one million pounds sterling (5,000,000 dollars). The amount sent to California was large, but is not readily ascertainable. Nor is it practicable to ascertain the entire production, scattered as it was over so extended a region and sent to market by so many routes. If it bore the same proportion to the foreign export as that of the previous year, it must have approached to 100,000,000 gallons; but this is hardly probable. The daily yield from the wells of the Oil Creek region was stated by the "Oil City Register" as 5,717 barrels a day, which would be equivalent to an annual product of about 71,000,000 gallons. A railroad has been constructed 27 miles in length, from Titusville to Cory, at the junction of the Atlantic and Great Western Railway and the Philadelphia and Erie Railroad, for the transportation of the oil, and its freightage is already very heavy. Large quantities are also sent in barges down Oil Creek and the Alle-

ghany river to Pittsburg, which has been the most important point for refining the oil, though now immense quantities are refined in the vicinity of New York, Philadelphia, Boston, Baltimore, and Cincinnati.

The existence of petroleum springs, pools, and lakes has been long known, and the bitumen and naphtha produced by them have been in use for various purposes for centuries. On the island of Zakanthus, now Zante, there were wells of petroleum in the time of Herodotus, 500 years before Christ, which were minutely described by him, and are still in existence and yield bitumen. Near Ecbatana, in Persia, was a petroleum lake, which Plutarch describes as having been on fire in his time. The perpetual fires of Baku, on a promontory of the Caspian Sea, which have been an object of such devout care among the Parsees for so many centuries, are fed from petroleum springs. In China, in Thibet, and especially in Burmah, near the Irrawadi, are extensive wells or pools of petroleum or naphtha, whose products have afforded a commodity for trade, to a limited extent, for centuries. The Dead Sea, in Palestine, has numerous petroleum springs on its banks, and the bitumen floats upon its waters. In Italy there are several springs of naphtha. In the island of Trinidad there is an extensive lake covered with the products of the hydro-carbons, and known as the Great Pitch Lake,—very fully described, in 1855, in the "American Journal of Science," by the late Dr. N. S. Manross, who had visited and explored it; and in Jamaica there are several pools of the same substance. The region near the head-waters of the Genesee river, and along Oil Creek, in Pennsylvania, has long been known as producing this mineral oil, which was used by the Indians in their religious ceremonies and also as a medicament for wounds. Under the name of Seneca oil, or Genesee oil, it has been sold for nearly a century, put up in small bottles, as a remedy for bruises, sprains, &c. The region along the south-east shore of Lake Erie has undoubtedly extensive lakes of it at some distance below the surface. At Fredonia, in Chautauqua county, New York, many years ago, bubbles of inflammable gas were observed ascending from the mud at the shore of the lake, and the inhabitants constructed a gasometer, collected the gas which ascended, and utilized it for lighting the streets of their village. Yet, while so widely diffused and so generally known, the idea of its adoption as a substitute for oil in illumination seems not to have been practically acted upon before 1859.

Opinions are divided as to the origin of petroleum. It was at first regarded by geologists as wholly a product of vegetable carbonisation; and it was alleged that the marine vegetation of some portions of the carboniferous era was so rich in hydro-carbons that, under the pressure of the superimposed strata, the oil or petroleum was expressed from them, and flowed into reservoirs in the limestone strata of the coal measures; but it has been found of late that the oil, though sometimes found in the cavities of the limestone rocks of the carboniferous period, is also sometimes found above or below them; and the impression is gaining ground that it may have had its origin in the destruction and decomposition of animals as well as vegetables.

The fluctuations in the price of the oil during the year 1862 were extraordinary. In New York and Philadelphia, at the commencement of the year, the crude oil was sold at 22½ to 24 cents a gallon; in May, June, and July, it had fallen to 9, 10, and 11 cents; November 1, it had risen to 18 to 23 cents, and on the 29th of the same month was sold in Philadelphia at 40 and in New York at 55 cents the gallon: while at the close of the year it had fallen again to 25 cents. The fluctuations in the refined oil were equally remarkable. In January, 1862, it brought 40 to 47½ cents, in April, May, and June, 19 to 25 cents, in October, 35 to 50 cents, in November, 95 cents to 1·10 dollar, and in December had fallen to 40 cents.

"The Times of the 7th of August, 1863, says:—"The trade in petroleum oil from America continues to increase at

the rate which was predicted soon after its discovery. In the first half of the year 1861 the exportation from New York, &c., was 3,250 barrels; in the same period of 1862 it was 108,000; and in the same period of 1863 it has been 425,000 barrels. A preparation of the material which is called colzarine oil, and which is free from smell and also from sulphur compounds, has lately enabled it to be used in the moderator lamp."

The following paper, on "The Oil Wells of Canada," was read before the Canadian Institute by Mr. SANDFORD FLEMING, C.E.

During a recent visit to the village of Oil Springs, in the township of Enniskillen, I made the following notes on the present condition of the oil wells in that quarter:—

The first flowing well discovered was that known as the "Shaw Well," on Lot 13 in the Second Concession. The oil was "struck" in the early part of last year, and continued to flow spontaneously for about ten months. This well was formed by digging about fifty feet through clay to the rock surface, and then by boring one hundred and fifty-eight feet through the latter. The flow from this well has now entirely ceased, after discharging a total estimated quantity of 35,000 barrels.

During the past year, or at least since the first discovery of the Shaw Well, there have been found in all about thirty flowing wells of more or less value in this section.

The yield of all these wells, as I was informed, was at one time as much as 12,000 barrels per day. They are all situated within an area of one square mile, and chiefly on the south bank of the Black Creek, only one having been discovered to the north of it. The number of flowing wells is now reduced to two, an old and a new one recently opened. These two wells are within a hundred feet of each other, and yield, it is said, over one hundred barrels per day each. Many of the old surface wells are now brought into requisition, and such of the old flowing wells as yet afford oil by pumping are worked by hand. The total yield from the flowing wells and all other sources at the present time is said to be about four hundred barrels per day.

There is one remarkable peculiarity connected with the stoppage of the natural discharge of oil from the wells, which might here be mentioned. The deepest wells invariably have been those which first ceased to flow; and the two shallowest of all the thirty wells are those only which now yield a natural discharge of oil.

I ascertained the depth of nine separate flowing wells, at points scattered over the whole oil-producing area, to be as follows:—

The deepest well.....	G	is 230 feet in the rock.
" next deepest	I	is 208 " "
" "	B	is 200 " "
" "	C	is 182 " "
" "	H	is 180 " "
" "	D	is 162 " "
" "	A	is 158 " "
The shallowest wells {	E	is 109
	F	is 109

At present flowing

It ought to be borne in mind that I give the depths under the rock surface, not under the surface of the ground, the former being nearly level, while the latter is very uneven. Over the surface of the rock, the thickness of clay ranges from forty feet in the flats of the creek to eighty feet on the banks.

The deepest well (G) was the first to fail; in fact, this one only discharged 4,000 barrels in all. The next on the list (I), the "Feroe" well, failed. Then the wells (B and C) at opposite extremities of the oil-producing area gave way. Then well (H), in the centre, and close by the gum beds, ceased flowing. Then various intermediate wells failed, until now the only old well flowing is F, with a depth of one hundred and nine feet under the rock surface, and its companion (E), recently

made, within thirty or forty yards of it, and to the same depth in the rock, yields a copious supply.

In ceasing to give a discharge of oil, these wells seem to give no previous indications of a coming change. The iron pipe which conveys the fluid from the bore in the rock to a convenient height above the surface of the ground continues to yield a discharge, but this discharge is suddenly changed, in most instances from petroleum to salt water, and the water flows on in a continuous stream, as did the former substance.

The mention of some apparent anomalies may be of interest to those who desire to form satisfactory theories regarding the various phenomena connected with the mineral oils.

1. In the immediate neighbourhood of all the flowing wells, and on the next lot to what is termed the gum-beds, the rock was bored to a depth of three hundred feet—seventy feet lower than the lowest well—without finding the slightest trace of oil.

2. About twenty yards from the flowing well marked I, a second bore was made in the rock to a greater depth by seven feet than the first well, without finding oil.

3. In another case the rock was bored about fifty feet from a good flowing well, and twenty-five feet deeper, without success.

4. But perhaps the most singular case is the following :—Some time after the “Shaw” well flowed so successfully, a second party bored the rock to the same depth about 100 yards from it, and found a copious discharge of oil, but this second well had the immediate effect of reducing very materially the flow from the “Shaw” well. When either was plugged up, the other yielded a full discharge; but when both were allowed to flow, each yielded only a partial supply. A third party, owning a small oil lot between the two wells, commenced boring on a line drawn from the one to the other at the distance of about thirty yards from the “Shaw” well; he naturally expected to rob both wells, whilst their owners (who by this time had formed a co-partnership) had every reason to fear his certain success. All parties, however, were doomed to disappointment, as the third well proved an utter failure, although the rock was bored to a much greater depth than the other two wells.

I may mention that although traces of petroleum have been found at several places beyond the immediate neighbourhood of the village of Oil Springs, viz., at Bothwell, at Tilsonburgh, and at other points within a circle of perhaps ten or fifteen miles, yet, with one exception, I believe no flowing well has been struck beyond a very limited area. The exception referred to is at Petrollea, on lot 14 in 18th concession, Enniskillen, and about six miles from Oil Springs villages. The rock is here bored to a depth of three hundred feet—five hundred and sixty-three feet under the surface of the ground—and a constant stream of salt water and oil is discharged, equal to, it is estimated, 1,200 barrels per day; and of this yield about one per cent, or 12 barrels per day, is found to be petroleum.

There are at the present time a great number of refineries in the neighbourhood of the springs. I had no means of ascertaining the exact number, but I was told that, reckoning large and small, they could not number much fewer than one hundred. The capacity of these refineries is estimated to be equal to 1,500 barrels of crude oil per day, whilst the total yield of the springs is said to be not much more than four hundred barrels.

The “oil-men,” although discouraged, are not without hope. They think that, as in Pennsylvania, an increased supply of petroleum will be found by sinking wells to a greater depth, and, accordingly, they are making arrangements, if they have not already commenced, to sink a test well to the great depth of one thousand feet under the surface.

I was informed that, although only about 150,000 barrels of petroleum have been shipped, a total quantity of 300,000 barrels must have been discharged, up to this

date, from all the wells, about half of the total yield having been allowed to run to waste. To give some idea of the capacity of the hidden reservoirs in which the petroleum has been stored, I may mention that 300,000 barrels are equal to nearly 2,000,000 cubic feet, and that if brought into one place, the crude oil discharged from the wells of Enniskillen would be sufficient to cover an area of five acres of land to a depth of ten feet.

FRAUDULENT ASSUMPTION OF EXHIBITION AWARDS.

The following report has been issued by the Committee appointed at the meeting held on the 18th day of June at the Society's House :—

A meeting of gentlemen, to whom prize medals and certificates of honourable mention were awarded by the Commissioners of the Exhibition of 1862, was held at the rooms of the Society of Arts (by the kind permission of the Council of that body), on the 18th of June last, when a Committee was appointed for the purpose of obtaining protection for the prize medallists against the unauthorised assumption of the medals and honourable mentions by persons to whom they had not been granted.

The meeting was called in consequence of a recent case, in which an application was made to the Court of Chancery for an injunction to restrain the piracy of the prize medals by a manufacturer who had not obtained any prize medal, nor exhibited at the Exhibition, but which application had failed, the Vice-Chancellor having decided that, by the existing law, the grant of a prize medal to one manufacturer or exhibitor created no right on his part to restrain any statement (fraudulent or otherwise) by another manufacturer of a similar article, to the effect that he had obtained a medal.

The Committee, after conferring with some members of the Society of Arts, obtained the necessary professional assistance, and caused a Bill to be prepared for the purpose of giving effect to the views of the meeting by whom they were appointed. This Bill was drawn with the utmost possible care, with the assistance of gentlemen who had been professionally connected with the “Merchandise Marks Act” of last year, and was settled by two counsel who have made the Trade Marks and Copyright Acts a special study, and who are the authors of the most recent legal works on those subjects; and was afterwards submitted to the consideration and correction of a learned judge, who most kindly afforded to your Committee the benefit of his great experience.

The Draft Bill so prepared was laid before the President of the Board of Trade, who, while expressing his desire to assist in promoting the object in view, hesitated to introduce any measure of the description contemplated into the House of Commons at so late a period of the session.

It became necessary to apply to the Earl of Granville for aid in this difficulty. Some discussion took place, and very earnest representations were made to his lordship of the great importance of the question involved, and the absolute necessity, if any benefit at all were to be derived from any legislative enactment, that the requisite measure should be passed in the session which has just terminated. Earl Granville received the representatives with the utmost kindness and urbanity, and expressed his desire to assist the Committee in the objects they had in view; but, after a consultation with some other members of the Government, a doubt was expressed whether the Bill, as prepared by the Committee, was not likely to lead to a too lengthened discussion for so late a period of the session.

The result was that a gentleman, officially connected with one of the Departments of the Government, was instructed to prepare a short Government Bill, in lieu of that prepared by the Committee, who were, however, consulted, and through their legal advisers made various

suggestions on that Bill, as at first framed. Some of these were adopted; as respects others, the Committee were less fortunate.

The measure as introduced may have been deemed imperfect, but it was apparent that the Committee's clearest possible duty was to aid, by every means in their power, the passing of that measure, even if needing amendment in a future session, rather than allow Parliament to dissolve and the recess to pass without any legislative enactment being obtained, the result of which would have been that, before Parliament re-assembled, the continued piracies of Exhibition awards would have deprived them of value in the hands of the real holders.

The measure so introduced has, with some trifling alterations, become law. The Committee feel confident that the evils complained of will be thereby checked, and that the holders of the awards have the strongest grounds for congratulation.

The measure was introduced, and read a first time, on the 20th July;—read a second time, and Committee dispensed with, on the 21st;—amended, read a third time, and passed in the Lords,—reprinted and introduced in the Commons, and read a first time there, on the 23rd:—read a second time, passed through Committee, and reported, on the 24th;—read a third time and passed, after a long debate, on the 27th;—and received the Royal assent on the 28th, under the title, "The Exhibition Medals Act, 1863."*

This result was only arrived at by dint of very great exertion on the part of those who took any active part, either in the proceedings of the Committee or the carriage of the measure.

The Marquis of Clanricarde kindly undertook, at the shortest possible notice, to take charge of the Bill in the House of Lords, and by his clear and admirable statement of the objects and necessity for the measure, secured its unanimous adoption by that House.

A very large number of members, on both sides of the House of Commons, gave their aid towards the passing of the measure, and the thanks of the medal holders are most justly their due. It is difficult to distinguish where so many are entitled to acknowledgments, but it will probably be felt by all that the President of the Board of Trade, who took charge of the measure in the House of Commons, has added another to the many grounds on which he was already entitled to the thanks of the mercantile community.

The Committee applied to, and obtained the aid of, "The Mercantile Law Amendment Society," and through them the concurrence of the various Chambers of Commerce in the kingdom, and it is in a main degree to the great influence and established position of utility of the Mercantile Law Amendment Society that the success attained may be attributed.

It cannot but be felt that every medal holder will derive benefit from the Act that has been obtained, and that the commercial value of the awards of the Commissioners of the Exhibition of 1851 and 1862, both at home and abroad, has been greatly enhanced by the legislative protection secured.

Of course, the obtaining of an important Act (especially when carried through the legislature with such unexampled speed as in the present case), must be attended with considerable expense. It was necessary, to attain success, that individual members of the Committee should take upon themselves, not only more than their proportion of the labour, but the whole responsibility for the expenses incurred, and the Committee confidently rely on those who have received awards for subscriptions to defray the cost thus incurred in their service.

It is not proposed that the foreign exhibitors should be asked to contribute at all. It is to the defect of the English law, as it existed at the time the Exhibitions

were held, that the evils complained of have been attributable. This is a circumstance as to which the English exhibitors might have informed themselves, but for which the foreign exhibitors must have been wholly unprepared, and they cannot properly be asked to aid towards the necessary amendment of a law to which they are strangers.

A large number of the medal holders have expressed their strong feeling of the importance of the present Committee continuing organised for a time, to protect the interests of their fellow medallists, and probably to promote an Amendment Act in the coming session, or to watch the Amendment Bill which the President of the Board of Trade has promised to introduce. The Committee are unwilling to abandon the cause which they have once embraced, and have consented to continue their functions.

The Committee request information of every case that may come to the knowledge of any medal holder, in which any person falsely represents that he has obtained either a medal or honourable mention, and any suggestion as to measures to be adopted towards giving effect to the Act already obtained, and stopping the fraudulent dealings to which it is intended to apply.

Except in so far as any such further proceedings may be concerned, the Committee's task has been performed. They have obtained the legislative protection which they were desired to seek, and they trust it will be felt by the whole of those whose interests were confided to their care, not alone that every exertion has been used for obtaining the result desired, but that there is every ground for mutual congratulations, between the Committee and their constituents, on the unexampled rapidity with which this result has been arrived at, and the success with which their exertions have been crowned.

(By order) EDMUND JOHNSON, *Hon. Sec.*

August 15th, 1863.

HIGH TEMPERATURE OF THE SEASON.

The Abbé Moigno, in *Les Mondes*, of the 13th instant, speaking of the temperature of Paris, says that Sunday, the 9th of August, was one of the hottest days known for many years. The heat was stifling in the streets, with little or no circulation of air. The pavement actually burned the feet, and the asphalt almost melted under the direct rays of the sun. The leaves of the chestnut trees in the avenue leading to the Observatory looked as if they had been burnt, and in some cases had entirely disappeared from the trees. In a garden in the Rue Notre Dame des Champs, though enclosed, but far from the house, the thermometer in the shade, and distant from the wall, showed, at 2.30 p.m., 39½ degrees centigrade (103 Fahrenheit), and at 4.30 p.m., 36 degrees centigrade (96.8 Fahr.).

It has rarely happened that the heat of Paris has exceeded 36 deg. centigrade. Since the commencement of the present century, it has only once reached as high as 37.2 deg. centigrade, namely, on the 18th of August, 1842. In the previous century higher temperatures than this have been observed, as recorded in the tables prepared for M. Arago. The thermometer was then, however, differently placed from what has been the plan adopted for the last 60 years. The highest temperatures recorded in these tables are 39 deg. centigrade, 19th of August, 1763; 39.4 deg. centigrade, 14th August, 1773; 40 deg. centigrade (104 deg. Fahr.) the 26th of August, 1765. Thus it appears that for 158 years the temperature of the present year has been exceeded but once. The temperature of the 9th of August, as recorded at the Paris Observatory, was 36 deg. centigrade (96.8 deg. Fahr.).

In England, it appears from the Registrar-General's report for the week ending Saturday, the 15th inst., at the Royal Observatory, Greenwich, the mean temperature of the air in the week was 65.1 deg., which is 3.5 deg. above the average of the same week in 43 years. The mean daily temperature was above the average on every

* The Act referred to has already been published in the *Journal*, see page 615 of the present volume.

day except Friday. The highest day temperature was 84.9 deg., and occurred on Sunday (9th). The lowest night temperature was 50.1 deg., and occurred on Wednesday. The range of temperature in the week was, therefore, 34.8 deg. The mean daily range was 24.3 deg. The difference between the mean dew-point temperature and air temperature was 10 deg.

NEW KIND OF COTTON.

It is stated that cotton has been found in Cuba growing on a vine, which runs along and covers the ground. It is not very fine, but white and strong. As in the very hottest seasons there are heavy dews in Jamaica, it has been supposed that this kind of cotton is likely to succeed on the lands on which the Sea Island cottons will not thrive. A very small quantity was tried in various parts of Jamaica, and some at the reformatory near Kingston. Through the attention of Earl Russell and the Foreign-office, the Jamaica Cotton Company are likely to obtain a considerable quantity of the seed, as will appear from the following letters:—

Foreign-office, July 31st, 1863.

SIR,—With reference to my letter of the 2nd ult. I am directed by Earl Russell to transmit to you herewith a copy of a despatch which has been received from her Majesty's Acting Consul-General at Havana, reporting the steps he had taken to procure and to forward to Jamaica the cotton seed for which an application was made by the Jamaica Cotton Company on the 1st June.—I am, sir, your obedient and humble servant,

(Signed)

JAMES MURRAY.

S. Bourne, Esq., 55, Charing-cross.

Havana, July 1st, 1863.

MY LORD,—Immediately upon the receipt of your lordship's despatch, No. 9, of the 1st ult., I set about procuring the 100 lbs. weight of cotton seed of the particular species, a specimen of which was enclosed by the Jamaica Cotton Company; but I regret to inform your lordship that owing to the difficulty of obtaining that quantity, I fear that I shall not receive it from the country in time for transmission by the intercolonial mail steamer leaving this on the 7th inst., via St. Thomas, for Jamaica, which is the only means of communication between the two places. The seed will consequently be forwarded by the August packet to the Rev. Mr. Bourne.

The demand for cotton seed is very great here in Cuba; it is extremely difficult to obtain any owing to the blockade of the Confederate ports. If the Cotton Supply Association of Manchester would send me some tons of good cotton seed, it would be a great boon to the enterprising planters here; for I am happy to report to your lordship that the prejudice against the cultivation of that great staple in this island is being gradually overcome by the fine results which have been obtained by those who have tried it. I receive constant application for seed.

I am not prepared to make the report which is ordered relative to the quantity of cotton grown in Cuba, but I shall do so as soon as I am in possession of the data which I am collecting on the subject.—I have, &c.,

(Signed)

G. V. CRAWFORD.

DESTRUCTION AMONG SILKWORMS.

The authorities in the department of the Isère have announced that a premium of 40,000 francs is to be given to the author of an efficacious remedy against the disease which has caused so much destruction among silkworms in late years. In order to obtain the prize the candidate must prove that his remedy has proved efficacious during three consecutive years. Experiments are to be tried with the proposed remedy at Grenoble, or within a circumference of two leagues, on silkworms produced from 30 grammes of seed at least. Every person desirous of competing is to make known his intention to the administrator of the Commune where he proposes to make the experiment.

SCIENCE AND ART DEPARTMENT OF THE COMMITTEE OF COUNCIL ON EDUCATION.

RESULT OF EXAMINATIONS OF SCIENCE SCHOOLS AND CLASSES, MAY, 1863.

The total number of individuals under instruction in 1863, was 3,811; and, in 1862, 3,413; of these 869 were in uncertificated classes last year, and about 700 this, making the increase in students in certificated classes, between May, 1862, and May, 1863, 566. The total number of individual candidates who applied for examination in 1863 was 2,000, and in 1862, 1,708. The number of papers worked in 1863 was 2,671; there being in practical, plane, and descriptive geometry, 288; in mechanical and machine drawing, 194; in building construction and naval architecture, 107; in theoretical mechanics, 35; in applied mechanics, 22; in acoustics, light, and heat, 121; in magnetism and electricity, 207; in inorganic chemistry, 679; in organic chemistry, 157; in geology, 129; in mineralogy, 46; in animal physiology, 343; in zoology, 41; in vegetable physiology and economic botany, 126; in systematic botany, 84; in mining, 29; in metallurgy, 63; in 1862, the total number of papers was 1,943. The number of provincial local centres, where examinations were held in 1863 was 64; and in 1862, 45. The number of metropolitan centres where examinations were held (including this department) was, in 1863, 7; in 1862, 9. In 1863, the total number of successes was 2,127, viz.:—Passes, 668; honourable mentions, 510; third grade prizes, 458; second grade prizes, 309; and first grade prizes, 182; and 544 failures. In 1862, the total number of successes was 1,480, viz.:—Passes, 791; third grade prizes, 296; second grade prizes, 237; and first grade prizes, 156; and 463 failures.

Home Correspondence.

UTILISATION OF SEWAGE.

SIR,—You will do good service to British agriculture by inserting the following very important letter from Baron Liebig. It settles definitively the question, hitherto much disputed, of the value of a ton of town sewage, taken at its outlet.

How much is to be deducted from that value for conveyance to the fields is another part of the question; but it is generally admitted that from one farthing to three farthings per ton, according to elevation, would be an ample deduction. It is strange that our Legislature or Government has never, by a Committee or a Commission, elicited engineering data on this point. At Croydon the cost is not more than one farthing per ton: at this rate there is ample scope for profit to the ratepayers as well as farmers, at Baron Liebig's estimate of fourpence per ton.

Hitherto nearly all our attempts at sewage irrigation by means of steam power, pipes, hose, and jet, have been imperfect, from a want of sound engineering skill; hence they have been unduly costly. A mistake of an inch in the diameter of our supply pipes may increase our expense of delivery 100 per cent.

When once we are agreed as to the value of a ton of town sewage, delivered on the land, we shall not long differ as to the propriety or profit of applying a given quantity per acre. Those who now advocate 10,000 tons per acre per annum will be brought, by the questions of cost and value, to much more reasonable conclusions. 10,000 tons per acre, at Baron Liebig's estimate of fourpence per ton, would amount to £166 13s. 4d.! Many farmers would be astonished at our even proposing to expend £5 per acre in manure or guano. What would they say to £166 13s. 4d. per acre?

We are all gradually coming to believe in Liebig's great theory that in order to build up a perfect plan we must have all the necessary materials or elements in due pro-

portion and in a fit condition. No one certainly would doubt this, if applied to a house—for, wanting either lime or water, useless would be the bricks, timber, slates, and other materials.

I am, Sir, your obedient servant,
J. J. MECHI.

Tiptree Hall, Kelvedon, Essex, August 15th, 1863.

SIR.—The agitation at present going on regarding the application of sewage to the purposes of agriculture, induces me to offer a few remarks which may perhaps assist to throw some light on the different questions belonging to this most important subject.

It seems to me that, on the whole, people have not a correct idea of the matter. In the last twenty years a new branch of industry, which did not before exist, has developed itself on a large scale, and in like manner the importation of guano and the sale of various manures have increased to such an enormous extent. The manufacturers of and dealers in manures are, on principle, inimical to the utilisation of sewage, and, in the battle which is being fought, they constitute the inimical army whose forces should be by no means underrated.

The contest which this question has renewed is an old one—the contest, namely, between commercial and industrial and the agricultural interest. The manufacturers of artificial manures fancy their business would stop if it should once happen that the towns supplied the farmer with the necessary manure. If we examine the matter thoroughly we shall find that the anxiety of the manufacturers and dealers in manure is like the panic of the carriers on the eve of the introduction of the railroads. They also feared that the rail would put an end to their business. Yet we know that, owing to the greater traffic, the number of horses in use has since then everywhere increased. The sewage question is most intimately connected with the manufacturers of manure; so much so indeed that the latter may derive from it the greatest profit. It may be even said that it is in reality the manufacture of artificial manure which gives to sewage its peculiar value and importance for the purposes of husbandry, and it is this which I shall endeavour to explain in what follows.

It is well known that the manufacture of artificial manure is based on the doctrine that the nourishment of all cultivated plants consists of inorganic or mineral substances. Manure consisting of inorganic substances can be produced by the agriculturist only. The farmer produces farmyard manure; the manufacturer, on the other hand, mineral manure, with which he furnishes the farmer with those efficient elements wanting in stable dung. The most important fabrication is that of superphosphate of lime. The question of immediate importance to be decided is the value to the farmer of the sewage used, and it is easy to find this by comparing sewage matter with guano, the effect and price of which are known to the farmer, and of whose value he is able to judge. The problem to be solved is, therefore, how much of the efficient elements of guano a farmer can convey to his field in a ton of sewage; or how many gallons of sewage water are equivalent to a cwt. of guano. Regarding the component parts of the best sorts of guano, we have certain and reliable data, those relating to sewer water are less so; but we might long ago have been fully informed of its average contents if, last year, at the mouth of each sewer in London, five gallons of water had been collected morning and evening every day during the week, and at the end of the seventh day one gallon of the collected seventy gallons subjected to chemical analysis. It would be necessary, of course, to determine as nearly as possible the quantity of water discharged at each sewer. Lacking more certain data, I take Professor Way's analysis of sewage water, which this most reliable chemist made at the request of the General Board of Health.

I reckon that Peru guano contains 14 per cent. of nitrogen (= 17 ammonia), 12 per cent. phosphoric acid, and 6-tenths per cent. of potash. Professor Way analysed

the water of two sewers, one in Dorset-square, and the other in Barrett's-court, and found in one gallon of sewer water—

	Barrett's-court.		Dorset-square.
Ammonia	41·10 grs.	17·96 grs.
Phosphoric Acid...	10·44 „	4·17 „
Potash	48·18 „	3·32 „

The difference in the contents of the two sewers is very great, for the first contains twenty-nine more ammonia and phosphoric acid, and fifteen times as much potash as the other. According to the analysis of Drs. Hoffman, Franckland, and others, I am of opinion that I may take the contents of the Dorset-square sewer water as the average standard for my calculation. From the above figures it results that 101 tons (20,200 gallons) of this sewer water contains the same amount of phosphoric acid, more than three times as much ammonia, and sixteen times as much potash, as one cwt. of the best Peruvian guano.

It will be observed that there is a great difference in the proportion of phosphoric acid to ammonia in guano and sewer water. In guano this proportion is 6 parts of phosphoric acid to 8½ parts of ammonia; in sewer water this proportion is 6 parts of phosphoric acid to 26 parts of ammonia. The reason of this disproportion in the amount of phosphoric acid and ammonia in sewer water is at once perceived, if we remember that the bones of the slaughtered animals do not find their way into the sewers. These bones are, however, the manuring matter in which phosphoric acid abounds, and their component parts, let it be well understood, must be given back to the fields if it be intended that the soil shall retain its fertility. Potash and ammonia are, according to their prices, far more costly manures than phosphates, and in many cases quite as necessary for the field as this latter can be. Potash and ammonia are wholly inefficient and useless without the presence of phosphoric acid, but with the addition of phosphates they become efficient and valuable. The manufacturer of manure is not able to supply potash and ammonia to the farmer in sufficient quantity, and at an available price, but it is easy for him to collect the bones and make up the deficiency of phosphate by drawing it from natural sources.

It will, I think, be now perceptible what connection there is between the manufacture of superphosphate and the utilisation of sewage. If the farmer add to the sewer water the phosphate which is wanting in it, the efficiency of the water will be increased. Thus, 101 tons of sewer water to which 120 lbs. of superphosphate have been added are equivalent to 305 lbs. of Peruvian guano, and the value of the sewer water will be 305 lbs. of guano, at £13 12s. 6d. a ton, 498 pence; from this subtract the price of 120 lbs. of superphosphate, at £5 5s., 76 pence; which gives the value 101 tons sewer water, 422 pence, or 4d. for one ton. It must not be forgotten that sewage without the addition of phosphate is of much less value, because, if the farmer were to give the soil, in sewage, as much phosphoric acid as is in 305 lbs. guano, he would have to apply 305 tons of sewer water (instead of 101 tons), which would give the value of 1½d. per ton. I am of opinion that the proportion of ammonia which is brought into the soil by dressing the land with Peruvian guano is much too large and even noxious for future crops; but this does not belong to the present question.

From exact calculation of the liquid and solid voidings of London (the detail of which would be out of place here) we may conclude that 42 tons of ammonia, 10 tons of phosphoric acid and 7½ tons of potash find their way into the London sewers daily. These 42 tons of ammonia are contained in 247 tons of guano, the 10 tons of phosphoric acid in 83·3 tons guano; thus 163·7 tons remain in which the phosphoric acid is wanting; or, what is the same thing, if to the sewage obtained daily from London 100 tons of superphosphate of lime (at 20 per cent. of phosphoric acid) be added, the value of the daily voidings of the metropolis, or the sewage of London, is made equivalent to 247 tons Peru-

vian guano; or, by the addition yearly of 36,500 tons of superphosphate, we may acquire the value of 90,155 tons guano, at £13 12s. 6d. = £1,228,364. Deduct the price of 36,500 tons of superphosphate, at £5 5s. = £191,628, and we have £1,036,736 as the money value of the sewage. To this should still be added the worth of the potash in the sewer water. Potash is the manure which the farmer obtains with the most difficulty; it is that element, too, which renders his stable dung (the amount of phosphoric acid and ammonia being the same) of greater value and efficacy. In 247 tons of guano about $1\frac{1}{2}$ ton of potash are contained; but every day $7\frac{1}{2}$ tons are obtained in the sewer water, which gives a surplus of 6 tons, corresponding to 11 tons of sulphate of potash, giving yearly 4,015 tons, which, at £18 per ton, shows a money value of £72,270. Add this to the sum above given, and we have, as real annual money value of the London sewerage, £1,109,006.

The surplus potash won from the sewer water daily corresponds to the amount contained in 866 tons of stable dung. Without the addition of the superphosphate, the value of the sewage of London would only be £304,045. In the calculation of the value of sewer water, there is one factor doubtful—viz., the absolute amount of phosphoric acid, ammonia, and potash which a ton of said water contains. It might, probably, be found that some sewer water was richer, another more diluted or poorer in these component parts, but in the relative proportion I do not think that any very great difference would be found. Sewer water will, in the average, contain more potash than I have allowed for, inasmuch as the fluid voidings of horses are to be added, which increase the amount of potash. We may assume that one-third of the population of Great Britain, or ten millions of men, live on corn and agricultural produce imported from abroad. For this a pretty considerable number of millions of pounds sterling must be paid, besides another pretty considerable number which must be earned by the nation in order to pay for the purchase of manures to produce the food of the remaining 20,000,000 of inhabitants. Many superficial observers appeal to statistics, which appear to show that much of the land yields one-third more than it did in the last century, but this is not, they say, a sign of decrease of fertility; but they forget at what costs their larger crops are obtained, and that they are due to an enormous expense of capital for the purchase of foreign manure. It is a sign of a poor or an exhausted soil, if, in order to get high returns, we have to add large quantities of manure from without; a rich or fertile soil does not require such an addition.

The employment of sewage in agriculture could make it possible to bring large tracts of land into cultivation which hitherto, owing to the expense of tillage, had been laid waste and neglected; others, too, might be so improved as to make the crops remunerative, and good yields would bring in a larger revenue. The vast capital which hitherto has left the country to pay for corn and manure might be kept at home and employed for other purposes. Should the present state of trade and industry not materially change, a great part of this capital would be devoted to agriculture, and the natural consequence would be that the increasing population would find ample occupation in husbandry. Great Britain is large enough, if we take the arable surface of the land, to produce all the corn and meat necessary for its inhabitants. It is neither fantastic nor ridiculous to believe that, without purchasing foreign manure, and by a judicious utilisation of the sewage of towns and villages, England would be able to dispense with the importation of food from abroad. For her it would be a blessing if the application of capital to agriculture were found sufficiently profitable to awaken speculation in this direction, so that the industrial population, manufacturers, and tradesmen, might devote themselves to the production of bread and meat. These men are quite of another stamp, and care little for tradition or the authority of custom. They know their multiplication table, however, and in competition with such men the farmers would find it impossible

to persevere in their old jog-trot ways. The change thus brought about would be as great as after a revolution.

I am, Sir, your obedient servant,

JUSTUS VON LIEBIG,

President of the Royal Academy of Science, and Conservator-General of the Royal Scientific Museum.

PRESERVATION OF IRON PLATED AND OTHER SHIPS.

SIR.—It would appear by reading the two last numbers of the *Journal*, that the application of zinc and other metals, and their compounds, to the bottoms and sides of iron and wooden ships, so as to form a poisonous compound by the action of sea water, was a novel idea.

As early as 1851, while in San Francisco, California, I instituted a series of experiments with reference to the action of sea water on iron and wood when coated with various metallic compositions. The opportunity afforded for these investigations was particularly favourable, as the Pacific abounds in every description of molluscs, which destroy wooden structures of all kinds by eating into them so rapidly that in a few months a sound piece of timber resembles a honeycomb; the attachment of barnacles to the bottom of iron vessels, if unprotected, is so great as actually to seriously retard their sailing. The result of my experiments was in favour of the application of metallic zinc, as the chloride formed a slimy, slippery compound, corresponding to the butter of antimony, which is not only exceedingly poisonous, but very cheap and easy of application.

However, it was not until August, 1858, that I took out a patent, entitled "An Improved Coating Composition to Protect Vessels from Marine, Animal, and Vegetable Substances." As the specification will not occupy much of your space, I will give it in full—to wit:—

"I employ zinc, lead, and tin, either alone or in combination with such other metals, minerals, and metallic compounds, as will form a chloride by the action of sea water, and preserve and keep clean the bottoms and sides of ships or vessels by preventing the attachment of marine, animal, and vegetable substances. For this purpose I make a coating composition in which exists the powder or finely divided particles of any one of the metals, zinc, lead, or tin, or their oxides, or a combination of metals, so that a chemical decomposition will take place by the action of the chlorides existing in sea water. This compound being applied to iron vessels, a metallic chloride is formed on the surface, and becomes a preventive against the fouling of the bottoms. In applying these compounds I first clean the bottom and sides of the vessel so as to remove all foreign matter, then I coat the bottom with tar, pitch, varnish, paint, or any other substance. This preliminary coating being perfectly dry, I coat the surface again with a composition of pitch, tar, varnish, or any other cohesive substance in which has been mixed and incorporated the metallic powder or particles of zinc, lead, tin, or a combination of them or their oxides. I prefer charging the cohesive medium to its maximum extent, without impairing its tenacious or adhering property. I apply it by means of a brush or rolling iron, or in sheets made on a coarse textile fabric, or otherwise. The result of this application or coating will be, that as the sea water holds in solution the chloride of sodium, potassium, and magnesium, it will act on the metallic particles contained in the composition, producing a poisonous chloride of the metal or metals used, which is destructive to both vegetable and animal existence. The chemical action will be accompanied by a slight disintegration of particles from the surface—in fine, continually presenting a clean or new surface; the chloride of zinc, lead, and tin, are exceedingly poisonous. These metals are easily reduced to a state of powder; the two former are of comparatively small cost." I confess I do not see how Monsieur Jean Pierre Jouvin can sustain his patent, taken out in 1863? Certainly when I use the words in my specification, "And such other metals, minerals, and metallic compounds as will

form a chloride by the action of sea water," no subsequent patentee can avail himself of this principle, as herein consists the very essence of the invention.

I am not now vindicating the merits of my invention for any personal motive, as, having failed to pay the £50 tax in 1861, it became the property of the public*.

I may here mention that her Majesty's Government tested the invention on the sides and bottom of the *Lizard*. After being at sea for one year I received a notice that she was in dock at Sheerness, where I examined the bottom, and the result was most satisfactory.

I received the following from the Superintendent:—

"Sheerness, 1st November, 1860.

"DEAR SIR,—I send you a copy of the report sent to the Admiralty by the shipwright officers of this yard on the examination of the *Lizard's* bottom, as well as my remarks on their report, which I trust will be satisfactory.

"I am, &c.,

"CHARLES WISE.

"Dr. Collyer."

Though I spent a vast deal of time and money in attempting to convince the government of the superiority of metallic zinc as a coating composition for iron ships, for some unaccountable reason I received no further information on the subject. I have always attributed my want of success to Sir B. Walker's absence from the Admiralty, as it was through his instrumentality that I obtained the opportunity of making the trial on the *Lizard's* bottom; be that as it may—though my composition was a great success in actual practice, it received no official patronage.

I am, &c.,

ROBERT H. COLLYER, M.D., F.C.S., &c.

Beta House, 8, Alpha-road, N.W., August 15, 1863.

Proceedings of Institutions.

BERKHAMSTED MECHANICS' INSTITUTE.—The seventeenth annual report of this Institute speaks of its continued prosperity, and of the general support extended towards it by all classes of the town and neighbourhood. The number of members is considerably in excess of any former year, and amounts to 21 honorary and 149 ordinary, making a total of 170. The librarian states that there is an increasing application for books, and 1,400 volumes of sound and healthy literature have been circulated during the past year; this pleasing fact may be taken as one of the best proofs of the good the Institute is accomplishing. It is a matter of regret to the committee that they have not been able to make any addition to the library during the past year, but from the satisfactory state of the treasurer's accounts, this addition can shortly be effected. The lectures of paid lecturers have been more expensive than productive, in a pecuniary sense, but this deficiency has been nearly met by the receipts at the gratuitous lectures and readings of several members of the Institute, to whom grateful acknowledgments are especially due. The local exhibition which has been held under the auspices of the Institute was visited by about 2,500 persons, producing in gross receipts the sum of £54 3s. 6d., and involving an expenditure of £46 11s., leaving a balance of £7 12s. 6d., to be carried to the general fund of the Institute. The thanks of the Institute are due to those of all classes who kindly lent for the exhibition, many and valuable works of art, objects of science, articles of curiosity, and productions of

local manufacture. The best acknowledgments must also be rendered to those members of the Institute who ably and gratuitously contributed to several evenings' entertainments, by the performance of vocal and instrumental music. The committee close this brief record of the proceedings of the most successful year the Institute has experienced, with their best wishes for its increasing utility and prosperity. The treasurer's account shows that the receipts were £131 19s. 0½d., and that there is a balance in hand of £18 7s. 1¾d.

GILFORD YOUNG MEN'S MUTUAL IMPROVEMENT SOCIETY.

—The last report says that up to the time of the last annual meeting 30 young men had been received into the Society, and during the past session 10 active and 13 honorary members were admitted. During the winter 17 essays and 5 public lectures were delivered in connection with the Society. A number of debates also came off, in which the members all took a deep interest. In consequence of the recent connection of this Society with the Society of Arts, classes have been established for the training of the members in the subjects for which that Society offers prizes and certificates.

LONDON BANK OF ENGLAND LIBRARY AND LITERARY ASSOCIATION.—The Thirteenth Annual Report of this Association says that the prosperity of the last twelve months has been fully equal to any previous year. The number of subscribers for the year 1862–3 has been 484, making, with 14 life members, a total of 498. The number of books now in the library is 9,683; 418 of which have been added during the past year; viz., 353 new volumes, 50 volumes of magazines, and 15 volumes purchased to replace worn-out copies. This increase is slightly less than that reported last year, which is to be accounted for by the fact that a small part of the income of the Association has been applied to opening a subscription with the "London Library Company." Early in the year it was deemed advisable to subscribe £5 5s. to that company, which course was found to be so advantageous to the Association, that it was soon after determined to increase the subscription to £10 10s.; at the same time, however, decreasing that to Mudie's Library to the same amount, instead of allowing the latter to remain at £15 15s., thus making the subscription to each library £10 10s. The advantage of this arrangement is that the librarians are enabled to obtain a larger number of copies of new and popular works than they were when the subscription was confined to one establishment. It may also be mentioned that the committee have been enabled to purchase 86 volumes of works of permanent value and interest, in very excellent condition, from Mudie's surplus stock, at a saving of 70 per cent. upon the publishing price, and of 50 per cent. if purchased of the bookseller to the Association. The Committee have again to acknowledge the liberal donation of £20 from Mrs. Thwaytes, through the President, and also the usual annual donation of £1 1s. from the long-continued friend of the Association, I. M. Parsons, Esq. They also desire to express their thanks to those gentlemen who have testified their interest in the success of the Association by the gift of books, &c. The new catalogue has been completed, and is now in the hands of the members. The committee desire gratefully to acknowledge the liberality of the Governors in having allowed the catalogue to be printed in the establishment. They also desire to express their acknowledgments to Mr. Coe, the superintendent of the printing department, for the typographical beauty of the work; to the librarians for their great zeal and care in its compilation, and to Mr. J. B. Scott for his kindness in assisting to bring so laborious a task to a successful issue. The financial statement shows that the receipts have been £303 13s. 5d., and that there is a balance in hand of £13 12s. 2d.

* This is one of the many instances where the public neglect a patented invention, which has become public property by the non payment of the tax of £50 at the termination of three years. In my case the loss of the patent was necessity, not choice.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 7th, 1863.]

Dated 17th July, 1863.

1802. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machine knitting needles, and in machinery or apparatus for making the same. (A com.)

Dated 18th July, 1863.

1803. A. Clark, Gate-street, Lincoln's-inn fields—Imp. in revolving shutters and blinds, and in apparatus for the manufacture of the same.

1804. W. C. Page, Gabrick-street, Millwall—An improved mode of preventing and removing the incrustations in marine and land steam boilers.

1805. E. Holborow, Buckingham street, Fitzroy-square, and I. Parker, Houghton-street, Clare-market—Imp. in the construction of sights for fire arms.

1807. F. J. Mavor, Park-street, Grosvenor square—Imp. in horse shoes.

Dated 20th July, 1863.

1809. F. A. Calvert, Manchester—Imp. in machinery for opening, cleaning, and preparing fibrous substances.

1811. T. Knowles, Hulme, Lancashire—Imp. in machinery for opening, carding, and cleaning cotton and other fibrous materials when in a manufactured or partly manufactured state.

1813. A. Smith, Stratford, Essex—Imp. in machinery for dragging bristles, applicable also to drawing or sorting fibres and hair of different lengths.

1815. A. A. Pelaz, Lyons, France—Certain imp. in printing stuffs and other fibrous fabrics.

1817. J. Layman, Thavies-inn—Imp. in micrometer draughting scales.

1819. J. Goold, Corsham, Wiltshire—Imp. in the manufacture of ink.

Dated 21st July, 1863.

1820. F. L. H. Danchell, Red Lion-square—Certain imp. in apparatus for purifying water.

1823. W. L. Aberdeen, Belfast—Improved machinery for breaking or softening and preparing flax, hemp, jute, tow, and other fibrous substances.

1825. E. T. Bainbridge, St. Paul's Church yard—Imp. in ventilators.

1827. G. Haseltine, 12, Southampton-buildings, Chancery lane—An improved implement for harrowing and smoothing land. (A com.)

1829. E. Alcan, King-street—Imp. in apparatus for condensing steam. (A com.)

1831. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of mats, floor cloths or coverings for floors, straps, bands, ropes, and other analogous articles which are usually made of textile or fibrous materials. (A com.)

Dated 22nd July, 1863.

1835. J. White, Trinity-street, Trinity-square—Imp. in pyramid and other cans or feeders for oil and other liquids.

1836. C. Beslay, 11, Rue Menilmontant, Paris—Imp. in making all woven and thready fabrics water-proof. (A com.)

1839. J. Simmons, Rainham, Sittingbourne, Kent—Imp. in ploughs.

Dated 24th July, 1863.

1850. J. Kirkland, Liverpool—Imp. in apparatus for working hydraulic presses.

1852. A. English, Hatfield—Imp. in apparatus for securing and protecting horses and other cattle during their transit by rail and other ways, and on board ship.

1854. B. Birnbaum, 21, New Broad-street—Imp. in gaiters and leggings.

Dated 25th July, 1863.

1856. G. H. James, J. M. James, and J. James, 10, Dyer's-buildings, Holborn—Imp. in the manufacture of covers for purses, wallets, and pocket books.

1860. C. Crockford, Holywell, Flintshire—Imp. in the treatment and utilisation of certain of the waste products from the manufacture of alkali and bleaching powder, and also from certain smelting operations.

Dated 27th July, 1863.

1862. W. Tranter, Birmingham—Imp. in breech-loading and other revolving fire-arms.

1964. T. Thorne, Southsea—Improved apparatus for disengaging ships' boats.

1866. R. A. Brooman, 166, Fleet-street—Imp. in sleepers or supports for the rails of railways. (A com.)

1868. J. Whittaker, Mons Mill with Walton-le-Dale, Lancashire—Imp. in engines for obtaining motive power by steam, air, or any other vapour.

Dated 28th July, 1863.

1874. J. Jewell, Devoran, near Truro, Cornwall—Imp. in setting boilers.

Dated 29th July, 1863.

1876. J. Sainty, Burnham Market, Norfolk—Imp. in the construction of feeding troughs for sheep and other cattle.

1878. N. Thompson, Abbey-gardens, St. John's-wood—Imp. in apparatus for stopping the bung holes of casks and similar vessels, also in tools or implements for fixing and removing such stopping apparatus.

1880. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—An improved self-acting flushing apparatus. (A com.)

1882. E. Sturge, Walworth—Imp. in coating or protecting metallic surfaces.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1900. R. Stewart, Elmira, New York—Imp. in operating the cut off valves of steam engines.—31st July, 1863.

[From Gazette, August 14th, 1863.]

Dated 22nd April, 1863.

999. T. Settle, Bolton—Certain imp. in "flyers" to be employed in roving, slubbing, and spinning cotton and other fibrous substances.

Dated 8th May, 1863.

1151. H. Schooling, 5, 6, and 7, North-side, Bethnal-green—Imp. in moulding or shaping lozenge paste or other plastic materials.

1154. J. H. Bailey, New York—An improved mechanical movement for producing an impelled current of air for lamps, and which may be used for other purposes. (A com.)

Dated 23rd May, 1863.

1293. E. Barlow, Bolton, J. Ashworth, jun., Turton, near Bolton, J. Newhouse, Farnworth, near Bolton, and F. Hamilton and W. Hope, Bolton—Imp. in lap machines for preparing cotton and other fibrous substances.

Dated 3rd June, 1863.

1385. E. A. Locke, Boston, Suffolk, U.S.—Improved means of securing identifying labels or tags to bales of fibrous material. (Partly a com.)

Dated 20th June, 1863.

1497. T. Petitjean, Geneva, Switzerland—Imp. in the manufacture of glass.

Dated 25th June, 1863.

1603. W. Kirrage, 1, Victoria-street, City—Using Apo elastikon hyphasma as a new and improved cloth for floors, roofs, walls, tanks, and other linings, being impervious to damp and of great strength and durability.

Dated 2nd July, 1863.

1649. W. Miller, 70, Upper Stamford-street, Blackfriars—An improved mode of evaporating through the combined agencies of heat and centrifugal force, and the machinery employed therein, more particularly applicable to saccharine solutions.

Dated 6th July, 1863.

1673. J. Samuel, 26, Great George-street, Westminster—Imp. in the manufacture of gas for lighting and heating purposes, and in apparatus connected therewith.

1678. H. Caunter, Stornoway—An improved lubricating matter or composition.

Dated 7th July, 1863.

1681. C. Schiele, 20, Milton street, Manchester—Imp. in turbines.

1687. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of seats, chairs, sofas, lounges, and other similar articles of furniture. (A com.)

Dated 8th July, 1863.

1695. H. Armstrong, Whitby, Yorkshire—Imp. in the manufacture of alum.

Dated 9th July, 1863.

1713. W. V. Wilson, Jubilee-street, Mile end—Imp. in the manufacture of red colouring matter.

Dated 11th July, 1863.

1735. A. Dixon, Harborne, Staffordshire, and J. Pumphrey, Birmingham—A new fastener or holder for flowers or other decorations to coats and articles of dress.

Dated 13th July, 1863.

1743. R. D. Dwyer, Warrington, Lancashire—Imp. in the construction of letter copying presses.

1749. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for suspending chandeliers, gasellers, and other weights. (A com.)

Dated 14th July, 1863.

1765. J. L. Todd, Belfast—Imp. applicable to the rollers of machines employed for spinning fibrous materials whilst in a wet state.

Dated 16th July, 1863.

1785. C. Stoker, Leigh Sinton, Worcestershire—An improved expanding and contracting horse collar.

1787. J. Lamb and S. Tovey, Kidderminster—Imp. in looms for weaving carpets.

Dated 17th July, 1863.

1795. J. Darrieux, Candéran, France—Pounded glass powder for cleaning metals, and also for tooth powder.

Dated 21st July, 1863.

1822. W. Clarke, Forest-road, Nottingham—Imp. in the manufacture of fabrics in twist lace machinery.

Dated 22nd July, 1863.

1833. J. Ronald, Liverpool—Imp. in apparatus for dressing or preparing for spinning hemp, flax, Manilla hemp, and other like fibrous material.

Dated 23rd July, 1863.

1840. W. Cole, 15, Wentworth-road, Bow-road—Imp. in apparatus for securing the safety of persons in window cleaning or otherwise working outside of windows.
1841. A. T. Holden, Birmingham—Imp. in carriage and other springs.
1842. L. L. J. Fillion, 10, Rue de la Fidelité, Paris—Imp. in apparatus for extinguishing chimney fires, and in preventing explosions.
1843. M. A. Soul, 3, Leadenhall-street—Imp. in expelling solid and liquid refuse matter from steam and sailing ships below the water line, applicable also for discharging cannon below water from ships and forts, and in part for charging gas retorts and iron furnaces, and for other similar useful purposes. (A com.)
1845. W. Garforth and J. Garforth, Dukinfield, Cheshire—Certain imp. in preparing, beetling, or finishing textile fabrics, such as cotton, wool, linen, or other fibrous materials.
1847. W. Horton, Glasgow—Imp. in fire arms.
1849. T. Perkins, Exchange-buildings, Litchin, Hertfordshire—Imp. in horse rakes and hand rakes.

Dated 24th July, 1863.

1851. W. L. Barnes, M.A., Chippenham—An improved method of breaking the speed of and stopping railway trains or other locomotive wheeled carriage or carriages, at the same time signalling to the driver, or for using the signal and break separately.
1853. T. Sturgeon, Belle Sauvage-yard—Imp. in chains.

Dated 25th July, 1863.

1855. T. C. Bull and T. Morgan, Wobley, Hereford—An apparatus for collecting fruit from trees without injury.
1857. P. E. Gay, 5, Rue de Grenelle, St. Honoré, Paris—Imp. in boring apparatuses.
1858. J. Boyd, Glasgow—Improved mechanism for forming imitation selvages or longitudinal cords in weaving.
1859. F. Tolhausen, 17, Faubourg Montmartre, Paris—Imp. in the manufacture of gun barrels. (A com.)

Dated 27th July, 1863.

1861. J. W. Welch, Manchester—Imp. in sizing and finishing fabrics, and in the machinery or apparatus employed therein.
1863. F. Ford and L. Ford, Gloucester—Imp. in the manufacture of various articles with surfaces in imitation of different kinds of marbles or similar ornamental materials.
1867. J. Pain, Fort-street, Spitalfields—Imp. in the manufacture of umbrellas and parasols.

Dated 28th July, 1863.

1873. D. Taylor, Bonchester-bridge, Roxburgh, N.B.—Imp. in ventilating hay, corn, and other ricks, and in apparatus connected therewith.
1875. W. T. Smith, Dalston—An improved method of securing or tightening the cords of blinds and other rollers.

Dated 29th July, 1863.

1877. P. H. Girardin, Paris—Imp. in lamps.
1879. G. Rickaby, St. Giles's-road, and T. A. Barrett, 73, Observatory-street, Oxford—Imp. in window frames and sashes.
1881. W. E. Newton, 66, Chancery-lane—Imp. in cartridges. (A com.)

Dated 30th July, 1863.

1883. G. Inskeep, Madeley, Stafford—An improved mill for grinding bones, grain, logwood, and such like substances.
1885. J. Boeddinghaus, Elberfeld, Prussia—Imp. in means or apparatus for the production of printed or particoloured yarns.
1886. J. T. Stevens and C. Hoare, Bridport, Dorsetshire—Imp. in machinery for the manufacture of yarns, threads, laid twine, and other cordage.
1888. W. Firth and S. Firth, Burnley, near Leeds—Imp. in machinery and apparatus for working coal and other mines, and in apparatus for loading waggons or other vehicles.
1890. R. Hoe, Leadenhall-street, and H. J. Cole, New-street, Kensington-road—Imp. in fastenings for packing cases.
1891. T. Apps, Lower Norwood—Imp. in four-wheeled vehicles.

Dated 31st July, 1863.

1892. W. Graham and J. Graham, Burnley—Certain imp. in looms for weaving.
1893. G. Sigi, Vienna—Imp. in the construction of force pumps.
1895. J. P. Culverwell, Dublin—Imp. in railway lamps.
1896. J. B. Andreux, 12, Rue Notre Dame de Nazareth, Paris—Imp. in the application of steam to toy boats, or other similar toys where steam can be employed as a motive power.
1898. J. F. Dickson, Rouverie street, Fleet-street—Imp. in the manufacture of boots and shoes.

Dated 1st August, 1863.

1901. W. Cotton, Loughborough, Leicestershire—Imp. in the manufacture of looped fabrics, and in machinery or apparatus employed therein.
1902. R. A. Brooman, 166, Fleet-street—Imp. in dyeing mixed animal and vegetable fibres, whether in a raw or manufactured state. (A com.)

1903. R. A. Brooman, 166, Fleet street—An improved warming pan. (A com.)

1904. G. Taylor, Leeds—Imp. in shaping boiler and other plates, and in apparatus employed therein.
1905. J. Hoefler, Manchester—Certain imp. in the method of preparing and treating "Codilla fibre" and tow, to render them available as a substitute for cotton, or to be mixed therewith.
1906. J. Kirk, Burnley—Certain imp. in looms for weaving.
1910. T. Fellowes and H. Hemfrey, Spalding—Imp. in apparatus for elevating straw and other agricultural produce.
1911. J. E. Vanner, Coleman-street—Imp. in the manufacture of umbrellas and parasols.

Dated 3rd August, 1863.

1912. E. A. Cowper, 35A, Great George-street, Westminster—Imp. in self-acting mules for spinning.
1913. J. W. P. Field, 233, High Holborn—Imp. in the manufacture of sheaths or cases for staves or other similar weapons.
1916. H. Woods, Burton-upon-Trent—Imp. in the apparatus used for regulating the temperature during the process of fermentation in the "union cask," "tunning cask," or "cleansing cask."
1917. J. Munro, 13, Melton-street, Euston-square—Imp. in apparatus for producing optical illusions.

Dated 4th August, 1863.

1919. J. Abrahams, 9, Great Prescott-street, Goodman's-fields (East)—Imp. in brakes for railway and other carriages.
1920. T. H. Baylis, 55, Mornington-road, Regent's-park—Imp. in hawse pipes, mooring pipes, and deck chain pipes.
1921. G. Stevens, Malvern-cottages, Portland-place-north, Clapham-road—Imp. in means or apparatus for effecting a regular supply of air or aeriform fluids for various purposes.
1922. S. Bury and J. Price, Manchester—Certain imp. in valves for steam engines.
1925. W. E. Newton, 66, Chancery-lane—Imp. in machinery or apparatus for moulding and casting hollow projectiles. (A com.)
1926. E. Pace, Queen-street—Imp. in machinery for cutting splints for matches, and for collecting the same.
1927. T. Pickersgill, Huddersfield—Imp. in machinery or apparatus for feeding wool, cotton, and other fibrous materials into machines for preparing the same for spinning.

Dated 5th August, 1863.

1929. G. Clark, 30, Craven-street, Strand—Imp. in the construction and protection of ships, vessels, and floating batteries, and in the preparation and arrangement of materials for those purposes, some of such imp. being applicable to the construction and protection of land fortifications.
1931. W. Storer and J. Hancock, Nottingham—Imp. in electro-motive engines.
1932. C. Garton, Bristol, and T. Hill, Southampton—Imp. in evaporating and cooling.
1934. A. V. Newton, 68, Chancery-lane—An improved mode of and apparatus for producing stereotype plates. (A com.)

Dated 6th August, 1863.

1940. J. Tenwick, Clarendon-street, Landport, Portsmouth—Imp. in self-acting valves and traps for sewers.
1942. W. Clark, 53, Chancery-lane—Imp. in ovens. (A com.)
1946. J. Kirkham, Euston-road—Improved apparatus for generating heat for smelting and other purposes.

PATENTS SEALED.

[From Gazette, August 18th, 1863.]

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| 15th August. | 452. T. Markland and J. C. Dickinson. |
| 430. J. Gimson. | 459. H. B. Barlow. |
| 431. E. Deville. | 461. W. Marsden. |
| 432. J. Durrant. | 462. C. Bilingsley. |
| 438. E. Strawson. | 463. J. Bentley and H. Booth. |
| 442. J. F. Spencer. | 464. C. W. Siemens. |
| 443. J. H. Bly. | 466. R. Bell. |
| 448. G. T. Bousfield. | 1163. W. E. Godge. |
| 449. J. Puntis and G. Cox. | 1167. W. Boaler. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 18th, 1863.]

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| 11th August. | 1980. C. Green and W. Asbury. |
| 1968. E. Wroughton & T. Holmes. | 2261. W. E. Newton. |
| 1991. R. Mole and F. M. Mole. | 14th August. |
| 12th August. | 1976. W. Holmes and J. Oldfield. |
| 1979. W. Walton. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, August 18th, 1863.]

- 14th August.
1913. W. Tranter.